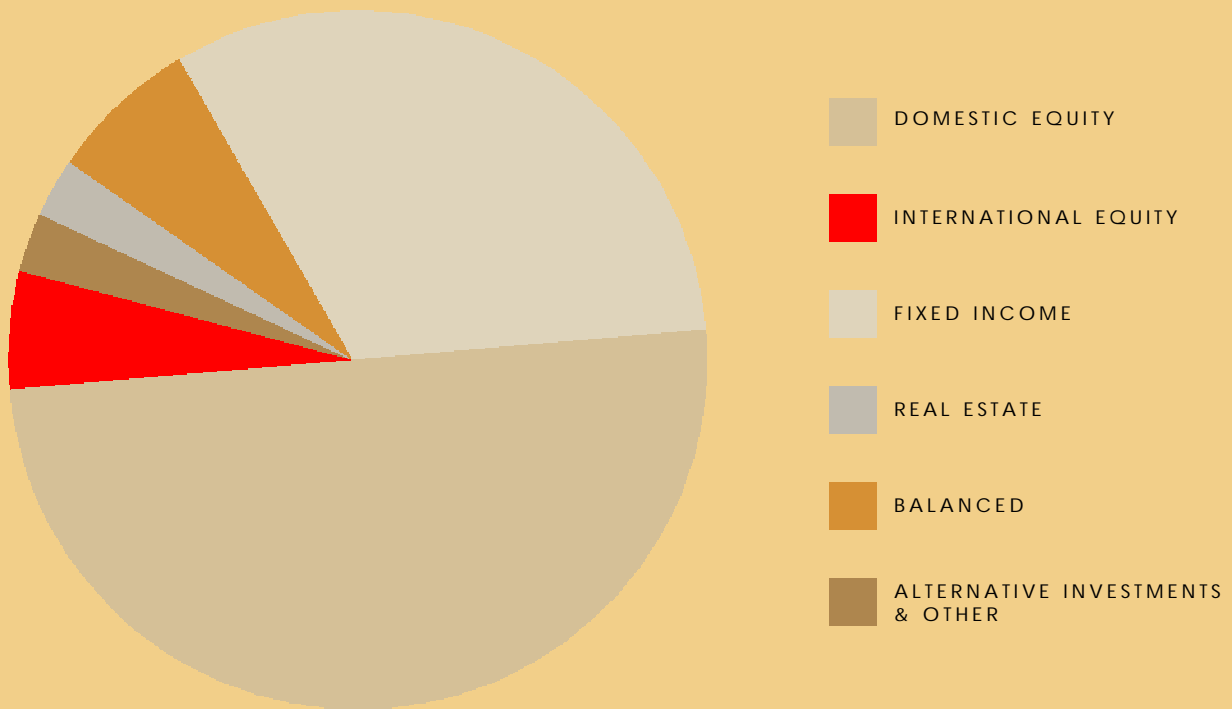


PUBLIC EMPLOYEE RETIREMENT ADMINISTRATION COMMISSION



FUNDAMENTALS OF ASSET ALLOCATION



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FIRST EDITION | FEBRUARY, 2000
PUBLISHED BY THE PERAC COMMUNICATIONS UNIT
5 MIDDLESEX AVE., THIRD FLOOR | SOMERVILLE, MA | 02145
PH: 617.666.4446 | FAX: 617.628.4002
WEB: WWW.STATE.MA.US/PERAC
PRINTED IN THE USA

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"DON'T PUT ALL YOUR EGGS IN ONE BASKET."

That timeless proverb not only carries an important message for many aspects of everyday life but is also the guiding principle behind a successful long-term investment program.

Indeed, the most important determinant behind success or failure in investment management is not individual security selection or trading by investment managers. Research shows that about 90% of the variance in a portfolio's investment returns over time is explained by asset allocation, the process of determining the percentage of portfolio assets allocated to specific asset classes such as stocks, bonds, real estate, venture capital, et al. Asset allocation has its intellectual roots in the 1950s when economist Harry Markowitz, who was later awarded the Nobel Prize for his work, began developing what became known as modern portfolio theory.

The goal of asset allocation is to maximize returns at a prudent level of risk or to minimize the risk involved in achieving a certain return. The process of determining the appropriate asset allocation involves an analysis not only of available investment asset classes but also of the liabilities of an entity such as a retirement system. The needs and preferences of the investor are the basic building blocks of an asset allocation.

In the case of a pension fund, board members have the exclusive purpose as fiduciaries to provide benefits for members and survivors through a program of prudent, expert investing. Their responsibility is to develop an investment program where expected returns meet their system's projected financial liabilities. Retirement board members must be sure their actuarial assumptions are sound, and they must assess the sensitivity of their portfolio to severe market declines

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and whether the portfolio provides sufficient protection against inflation.

The primary goal in constructing a portfolio is that the expected return be sufficient to satisfy an investor's financial objectives and be commensurate with a level of risk that the investor is comfortable with. There are several asset classes, or groups of investment securities whose behavior is similar in response to changes in economic circumstances, and each class (i.e., stocks) has several subclasses (large capitalization, midcap, small cap; growth and value). The major inputs to an asset allocation process are the historical and expected returns for each distinct asset class or subclasses, the volatility of those returns over time, and the correlation of returns among the asset classes or subclasses.

Risk means different things to different people. To a bungee jumper, it's the possibility that the cord might break. For an investor, risk means the possibility of losing money and not meeting one's financial objectives. Similarly, asset allocation is like wearing protective gear in athletics. A competitor might perform better if not hampered by protective gear, but without it, a blow to an unprotected part of the body could prove disastrous. Someone investing over the past few years might conclude that large cap growth stocks are the only asset class needed for a successful portfolio. Although those stocks have indeed been by far the best performing asset class in recent years, a prudently constructed portfolio will also have assets in currently underperforming sectors like bonds, small stocks, and real estate. These sectors currently serve as hedges that may inhibit maximum performance today but should cushion the portfolio to some degree when the high-flying growth stocks cool off, as history and logic tells us they inevitably will.

Thus, an asset allocation process today should properly include a number of different asset classes. It's not unusual for one asset class or investment style to dominate returns for four consecutive years as U.S. large cap growth stocks recently did (1995-98), but other classes—including small caps, international stocks, and real estate—have enjoyed similar extended periods of superior performance over the past quarter century. If we examine historical returns of large U.S. stocks, small U.S. stocks, international stocks, and high grade U.S.

bonds over the twenty years through 1998, there was only one year prior to 1995 that large stocks provided the best performance among these four asset classes.

An effective portfolio is not just the sum of its parts but should incorporate the expected interaction among those parts. Correlation measures the likelihood that two asset classes will move in the same direction, and selecting asset classes that have as little correlation with each other as possible should reduce risk and volatility in a portfolio while helping to achieve expected returns.

A guiding principle of asset allocation is that a portfolio diversified among asset classes will never match the performance of the best asset class each year but it will also never equal the worst. The past few years, during which performance has been concentrated in a select group of U.S. stocks, have presented a serious challenge to proponents of asset allocation. Nevertheless, results from 1999 did show some distinct benefits from diversification among asset classes.

HISTORIC RETURNS

Historical data from 1926-98 compiled by Ibbotson Associates (a firm well known for its collection and analysis of investment returns) gives the compound annual returns of various classes of domestic stocks and bonds over this period, including large-cap stocks (11.2%), small cap stocks (11.8%), long-term corporate bonds (5.8%), and long-term government bonds (5.3%). Data from shorter periods indicates the annual returns from additional classes, such as international stocks (12.7% since 1970) and real estate (9.0% since 1978).

Stocks have indeed been the best performing asset historically. Over the ten years ending 1998, the outperformance of stocks over bonds was even greater than in the above-noted 1926-98 period as the S&P 500 gained 19.2% annually compared to 9.3% for investment grade bonds. Furthermore, since 1926, the 1930s have been the only decade when bonds (long-term

governments) outperformed stocks (large or small caps). Returns on stocks are certainly volatile; more than one quarter of the time since 1926, annual returns have been negative. (Actually, the same observation holds for long government bonds although, as will be discussed, the magnitudes of gains and losses for bonds have been much smaller than those of stocks.)

The advantages of stocks are seen over time; over the 64 overlapping 10-year periods from 1926-98, large cap stock returns were positive 62 times, and they have been positive for every fifteen-year period over time. Stocks have outperformed bonds 61% of the time over one-year periods but 92% of the

time over 20-year periods and 99% of the time over 30-year periods. Thus, the longer an investor's time horizon, the more the portfolio should be biased toward equities. The advantages of equities are even more important after considering taxes and inflation. (Taxes, of course, are not a factor in pension fund investing.)

U.S. stocks clearly have a very favorable and impressive long-term return record, but one must be cautious when using either the widely-publicized Ibbotson numbers or any other historic returns as projections for future returns. Of the 54

overlapping 20-year calendar periods since 1926, stocks have returned less than 10% nearly 40% of the time. More ominously, additional research shows that the best equity market returns were achieved from investments made during periods when the price-to-earnings ratios were generally within the long-term historic average range of 14 to 16. Investments made when P/E ratios were 20 or higher (they are at all-time high of close to 30 today) resulted in typical annual returns of just 5% over the following 10 years. (As explained in the PERAC investment education presentation, *Understanding Investments*, the P/E ratio—a company's stock price divided by its earnings per share—is one of the most traditional measures of assessing the value of a stock.)

Some other observations about historical returns include the fact that stocks and bonds have both performed poorly in periods of high inflation and

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well in periods of low inflation. Indeed, inflation is one of the worst enemies of pension funds; during periods of high inflation, pension benefits tend to rise while investment returns are declining. The effect of business cycles is less clear; not every stock market downturn has corresponded with an economic recession and not every recession resulted in poor stock market performance.

MARKET TIMING AS A STRATEGY

Before examining the basic principles of asset allocation, there is an offshoot of the traditional process called “tactical asset allocation” which involves aggressive movement in or out of asset classes depending on current perceptions of their attractiveness. Looking at historical returns, a strategy that favors “tactical” short-term swings into or out of markets, as opposed to a strategy of disciplined asset allocation, appears unlikely to succeed. In general, investment strategies that worked in the past often don’t carry into the future. It is difficult to predict short-term swings in the market and in attempting to do so, market timers expose the portfolio to additional risk. This is because returns have been often concentrated in short periods.

Illustrating the concentration of returns, Ibbotson data show that if an investor had been out of the market during the S&P 500’s 40 best months from 1926 through 1998, he would have a return less than that of Treasury bills. If one had invested in an instrument replicating the S&P 500 at year-end 1925 and held it through the end of 1998, he would have amassed \$2,351. If he had instead invested in Treasury bills continuously over this period, he would have had only \$15. Pity the hapless market timer who was out of the market during the S&P’s 40 best months over that time; he would have had only \$14!

Adding to the futility—and the substantial risks involved—in trying to predict market swings is the burden of transaction costs.

INVESTMENT RISK

Consideration of investment risk is a vital component of the asset allocation process but it is not the only risk that fiduciaries must be aware of.

Operational risk refers to the possibility that an investment manager will fail to fulfill its mandate due to violation of guidelines, trading errors, inadequate risk controls, or outright fraud. **Counterparty** risk refers to problems that may

arise from irregularities pertaining to a particular exchange, broker, or other financial intermediary.

Just as combinations of risky stocks exhibit less risk than individual securities, combinations of asset classes can have less risk than individual asset classes.

The **investment risk** of an asset consists of two parts: 1) **Systematic risk**, also known as market risk or beta, which springs from general economic factors (such as a sharp interest rate rise) that affects all companies in a similar fashion, although with different magnitudes, and 2) **Unsystematic risk**, which is unique to a particular asset (such as a potentially adverse ruling from a product liability case) and unrelated to the overall movement of the capital markets.

Another way of looking at the different types of risks is to consider systematic risk the market risk that investors are *given* and unsystematic risk the active risk that investors *take*.

Diversification eliminates unsystematic risk because the positive and negative results of specific companies within the portfolio tend to offset one another in a random fashion.

Therefore, portfolios that are not well diversified are subject to increased volatility. Portfolio risk decreases as the number of stocks increases. Portfolios of 30 stocks or more will have most of the unsystematic risk eliminated, particularly if they are priced in the same range and held in similar amounts. Similarly, just as combinations of risky stocks exhibit less risk than individual securities, combinations of asset classes can have less risk than individual asset classes.

A traditional way of looking at investment risk is to compare the ranges of annual asset class returns over time. Those with wider ranges of returns are considered to have greater volatility. Risk measures the possibility of losing money and, although both large-cap stocks and government bonds have lost money on an annual basis almost one quarter of the time since 1926, the magnitude of swings has generally been much greater for stocks. The S&P 500 returned 34.1% in 1995 while long-term bonds have never done better than the 18.2% registered by Treasuries in 1993. The S&P suffered a 26.5% loss in 1974, while the worst year for bonds has been the 7.8% loss in 1994. In terms of quarterly performance, the differences are even more dramatic; since 1926, the worst quarterly return for bonds was -6.4% while that for large stocks was -37.7% and for small stocks -41.6%. Bonds often serve as a cushion against steep equity losses, as seen most recently in August 1998 when bonds had a positive return of 1.5% while stocks plummeted by 14.5%.

There are a number of ways to communicate investment risk. **Volatility**, or the uncertainty of an asset's return, is effective as a relative statistical measure. If an asset's returns over time are plotted on a graph, the arithmetic mean is the center of the distribution and the standard deviation (a number derived from a mathematical formula) measures the spread. If returns have a normal (bell-shaped) distribution, 68% of all returns are expected to be within plus or minus one standard deviation of the mean and 95% of all returns are expected to be within plus or minus two standard deviations of the mean. For example, using statistics from 36 monthly returns, an investor considers two investments which both had average monthly returns of 5%. The first, with a standard deviation of 2%, would have had a typical range of returns (two standard deviations) over the 36 months of between 1% (5%-4%) and 9% (5%+4%). The second investment, with a standard deviation of 4% for the same period, would have experienced more volatile returns, with fluctuations between -3% (5%-8%) and 13% (5%+8%).

As previously noted, annual returns on large cap stocks have been more than twice those of long-term government bonds since 1926, but the standard

deviation of those returns is also more than twice that of bonds. This significantly greater volatility explains the “risk premium” that investors have traditionally demanded of stocks relative to bonds.

Data compiled by Ibbotson since 1926 show that both government and corporate bonds have had standard deviation of returns of about 9% while that of large cap stocks has been about 20% and that of small cap stocks (which had returns only slightly higher than those of large caps) was 30%. Looking at the figure for large caps, this means that with a compound annual return of slightly over 11% over this period, returns would have been within the range of -9% (11%-20%) and 31% (11% +20%) two thirds of the time. (Chart One shows the historical risk and return relationships between stocks and bonds.)

Among other asset classes, intermediate bonds have shown about 60% of the risk of long-terms, and returns on real estate over the past 20 years indicate a relatively low standard deviation of about 7%.

The value of stocks as long-term investments is seen in their declining risk measures over time. The standard deviation of stock returns over a one-year period is 18% but drops to a very low 2% over 30-year holding periods, demonstrating that investors who can live with high variability of annual returns can expect a healthy composite return over long periods with a great deal of certainty.

After recovering from the Great Depression, annual volatility of large cap stock returns has changed very little from 1940 to the present. Indeed, the recent four-year period 1993-96 was the least volatile since 1963-66. On the other hand, volatility in bonds has increased substantially, first reflecting the higher inflation of the 1960s and 1970s and then reflecting the Federal Reserve's new policy of targeting money supply growth that it adopted in 1979.

C O R R E L A T I O N

The next step in asset allocation is to incorporate a measure of how various investments are expected to act relative to one another. The traditional input here is **correlation**, a measure of the degree to which two series move together. Correlation ranges from -1 , where if one rises in value, the other will fall (inverse correlation) to $+1$, where if one rises in value, the other will also (perfect correlation) with 0 representing a totally random relationship. Ideally, investment portfolios would consist of negatively correlated assets but most assets exhibit moderately positive correlation. For example, Ibbotson data indicate that government bonds and corporate bonds have a positive correlation of 0.94 , German bonds and Japanese stocks have -0.06 (no correlation), and commodities and small stocks have a negative correlation of -0.40 .

Correlation can change over time in reaction to economic or political events. For example, largely reflecting the Federal Reserve's changed monetary policy, the five-year rolling correlation between long-term bonds and large cap stocks—which was negative between 1956-66—has risen to the 0.30 - 0.60 range in recent years. The correlations between Spain's stock market and those of the European Economic Community have risen from 0.35 - 0.50 to in excess of 0.75 since Spain joined the EEC in 1986.

By combining two assets into a portfolio, the expected return is an arithmetic average of the individual returns but the risk is dependent on the correlation between the two assets. If the assets are perfectly correlated ($+1$), there is no diversification gain and the portfolio risk is the average of those of the two assets. If the assets are negatively correlated, then all risk can be eliminated. If the assets are not correlated (the most likely case), some risk can be eliminated by combining them. Thus, the standard deviation of a portfolio constructed by combining assets that are uncorrelated will typically be lower than that of either of the component assets.

History shows that small caps move together with large caps about three quarters of the time while the corresponding measures relative to large caps are about two-thirds for foreign equities, about 40% for real estate, and less than one third for bonds. Thus, bonds are seen as the best diversifying asset relative to large-cap equities and small caps the least effective in that regard.

OPTIMIZATION

Optimization in asset allocation is creating a portfolio that will achieve a particular return objective with the least amount of risk or a particular risk objective with as high a return as possible. An investor can theoretically choose from portfolios that consist not only of 100% allotments to specific classes (i.e., stocks) but also every possible combination of these asset classes to make up a total portfolio (e.g., 40% bonds, 60% stocks). Graphing expected returns versus standard deviation for each of these combinations, one derives an **“efficient frontier”** of “optimal” portfolios that maximize expected return for each level of risk. Theoretically, adding more asset classes to the process will extend the frontier higher, producing higher returns for no additional risk.

If one were to construct the above-noted graph with expected investment returns on the vertical axis and risk on the horizontal axis, this graph would have an entry for an all-stocks portfolio in the upper right sector (high return, high risk) of the chart and for all-bonds in the lower left (lower return, lower risk) of the chart. (The absolute lowest risk, lowest return entry would represent Treasury bills in the far bottom left of the chart.) The practice of asset allocation, in its most basic depiction, involves drawing a line between the two extreme points and determining what combination of stocks and bonds strikes the right balance between an investor’s required return and the level of risk he/she is comfortable with. In reality, the choice will involve more than just two broad asset classes because both the stock and bond markets consist of

several distinct styles and sectors and there also are the options of investing internationally as well as in additional asset classes such as real estate. Also, the “efficient frontier” of optimal asset combinations will typically be graphically represented by a curve whose points represent greater returns for a given level of risk than would be found on a straight line connecting the theoretical all-stocks, all-bonds, or similar points; this portrays the diversification gains that are achieved by combining asset classes that are not highly correlated. (Chart Two portrays the construction of a simplified efficient frontier using stocks and bonds.)

Investment manager Roger Gibson, in a recent book on asset allocation, analyzed the returns of four major asset classes since 1972 on a year-by-year basis. Analyzing volatility levels and returns for all possible portfolio combinations (including single asset investments and equally balanced combinations) using these asset categories, he concluded, “The pattern is clear. The more asset categories one includes in a portfolio, the higher the ... investment’s risk-adjusted rate of return.”

An important consideration in asset allocation is that, in order to produce portfolios that **will be** optimal, not that **were** optimal, the process of optimization requires **forecasted** expected returns, **forecasted** volatilities, and **forecasted** correlations. Historical data can, nevertheless, be very useful in the process of forecasting.

Many investment consulting firms have optimization software that produce recommended asset allocations based on modeling of asset class characteristics and inputs based on client needs and preferences. Confirming that computers cannot substitute for human judgement, consultants acknowledge that these optimizers might produce a recommended asset allocation that may appear extreme in the context of conventional investing practice. Thus, the end result of an asset allocation process is usually not the output of a predominantly quantitative model but is the result of a process in which the consultant and the client determine a combination of assets that not only should help the client achieve his/her goals over time but also satisfies the comfort level of the client.

ON THE OTHER HAND ...

There are some vocal dissenting voices to the theoretical frameworks governing the search for today's most efficient portfolios. First of all, some of the prominent research that inspired today's basic principles of asset allocation is questioned. Critics claim that it is wrong to focus on portfolio volatility rather than portfolio returns and that investors should be more concerned about the

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range of likely outcomes over the investment planning horizon than with the volatility of those returns. Also, the role of using largely historical returns to determine fixed allocations is questioned because historical returns are not necessarily reliable indicators of future returns. Indeed, historical returns could actually be perverse indicators since they are the highest after market tops. Another complaint is that attributing such a dominant role to asset allocation in determining portfolio outcomes serves to unfairly minimize the importance of costs.

Particularly for individual investors but also for institutional ones, differences in costs—operating expenses, management fees, brokerage commissions, custodial fees, et. al.—can play an important role in portfolio performance over time.

Also, some scholars question the emphasis on the historically far greater short-term volatility of stocks relative to bonds. They see the large risk premium traditionally attached to stocks relative to bonds diminishing as the differential in volatility between the two classes appears to be narrowing in recent years. For bonds, interest rates have become more volatile in recent years as the Fed fine tunes monetary policy in order to keep the economy growing at a sustainable pace. At the same time, stock investors may be perceiving less risk as a result of better investment education, new tax laws that have lowered capital gains taxation rates and have encouraged long-term holding in IRA

accounts, better governmental monetary and fiscal policy, less governmental economic regulation, and diminished foreign threats which give hope to an extended period of peace. As the historic bull market of the past decade has dramatically driven home the fact that stocks do outperform bonds over time, the “risk premium”, or extra return demanded by investors to compensate for the fact that stock returns are considerably more volatile than those of bonds, may be declining.

INTERNATIONAL INVESTING

One of the most contentious areas of debate concerns the value of international diversification. By placing a portion of assets in markets thought to be not correlated with the U.S. market, can an investor really reduce the volatility of the portfolio while maintaining and sometimes increasing returns? The world’s markets, particularly those of the developed countries, seem to be moving more in the same direction (if not in the same magnitude) in recent years. As investors in the fallen hedge fund Long-Term Capital Management painfully learned in August 1998, diversification won’t dampen volatility when global markets move together. Looking at one important recent development, the monetary union in Europe that began in 1999 will likely further the trend of making the characteristics of —and the returns from—markets on that continent increasingly similar.

The debate over the benefits of international diversification won’t be resolved anytime soon, but it may indeed turn out that the benefits from that strategy may be overestimated because of the slow but steady trend towards an increasingly homogenized global economy. The breakdown of trade barriers

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Certainly, there is no other major economy that has been firing on all cylinders like the U.S. over the past several years, a fact that has been reflected in our booming stock market. No other country is at the forefront of the technological revolution and also enjoys sound and stable economic and political leadership. The trouble with this argument against international diversification is that ten years ago investors were similarly drooling over Japan as the world's invincible economy. Until a turnaround in 1999, after several years of stalled economic growth and failed political leadership, Japan's economic and financial market performance turned out to be nothing short of disastrous during the 1990s.

Furthermore, the U.S. recently entered the tenth year of an economic expansion, with joblessness at a 30-year low, and a stock market that has been rising steadily and is valued at historic highs according to most traditional measures. By contrast, Europe and Asia are several years behind in the growth boom and generally have much more capacity to expand, as seen in much higher unemployment rates and other measures. The U.S. has spent the past ten years merging, restructuring, and deregulating as well as transforming itself into an information economy, while Europe has made only about half the strides as the U.S. and Asia (particularly Japan) is just beginning. Investors in foreign equity markets were generally well rewarded relative to U.S. stocks in 1999.

Aside from the economic arguments, analysis by Ibbotson Associates shows that the addition of **international stocks** to a simple portfolio of U.S. stocks, bonds, and cash *slightly* improves the risk/return tradeoff; that is, it slightly raises the frontier of efficient portfolios offering modestly better returns for a given level of risk. Looking at dollar-denominated returns over 1970-98 for the countries in the Morgan Stanley Europe Australasia Far East (EAFE) Index, the composite annual return was found to be 12.5% vs. 13.0% for the U.S. while the standard deviation was 19.2% compared to 17.3% for the U.S. A good number of the individual countries in EAFE had compound annual

returns higher than that of the U.S., including Ireland (19.5%), Hong Kong (18.8%), and the Netherlands (17.1%). Every country, however, exhibited greater volatility than the U.S., particularly Hong Kong (51.8%), South Africa (41.6%), and Norway (31.3%).

The major reason justifying the use of international stocks is the fact that many non-U.S. stocks have relatively low correlation with U.S. stocks as well as with each other. Nearly every developed country has a historical correlation of less than 0.50 versus the U.S., with the exception of Canada, whose correlation of 0.73 reflects its strong economic ties to the U.S.

In response to those who say that increased economic globalization has lessened the value of international investing, Ibbotson research indicates that international equity correlations with the U.S. over the ten-year period 1989-98 were only slightly higher than those for the period 1979-88, but the trend is surely upward.

Historical data on **emerging market** stocks has been compiled since 1985, and, through 1998, the record has not been very compelling. These markets do have low correlation with the U.S., but the compound annual returns of 19 countries in Asia, Latin America, and elsewhere were only half that of the U.S. while their composite standard deviation was 50% higher than that of the U.S. A number of countries, including The Phillippines, Chile, Columbia, Argentina, and Mexico did post superior dollar-denominated returns but several had volatilities that have been truly staggering, such as Argentina (175%), Brazil (105%), and Turkey (103%).

As previously noted, however, asset allocation involves not just historical analyses but utilizes projections of future returns, volatilities, and correlations. If one adopts a more optimistic case for performance of emerging markets, then the addition of international and emerging markets stocks to a traditional U.S. portfolio could significantly improve the risk/return tradeoff.

In a non-quantitative context, it is undeniable that the global economy is becoming more developed and that international investing is justified by the simple observation that the U.S. share of the world economic product has been

steadily declining and that an increasing number of the world's most important corporations are based overseas. Similar to restricting one's portfolio to a particular industry or style, limiting one's investments to a particular region or country serves to severely constrict one's opportunities in today's world economy. On the other hand, disadvantages of international investing include greater political and economic risk, currency risk, different accounting standards, and less efficient markets.

OTHER CONSIDERATIONS IN ASSET ALLOCATION

Some of the most important decisions in the asset allocation process occur after the basic asset class decisions are made. Increasingly, the next step in the process is not to directly commence an investment manager search but to decide what portion of the assets should be earmarked for **Active** vs. **Passive** management. Evaluating the advantages and disadvantages of each style can involve many factors and competing arguments but the choice ultimately comes down to the chance for added value over a benchmark in an active approach versus a lower cost, more tax-effective (for non-pension investors) indexing approach (assuming an appropriate index product is available for a particular asset class).

Another frequent issue in asset allocation is **rebalancing**, or what to do when the allocation to a particular asset class goes above or below pre-determined ranges as a result of changed market values or other reasons. Factors that enter into rebalancing decisions include transaction costs, liquidity, risk tolerance, and taxation (where applicable).

Among the typical disciplines for rebalancing are 1) to do it on a set schedule but at least annually, or 2) when an allocation is more than 5% away from its target. An option for retirement systems that do periodic cash flow investing is to rebalance by investing in the assets with allocations that are currently too low. Another option is for retirement systems to work with their

consultants to consider a revision of their asset allocation.

An effective rebalancing program is one that serves not only to reduce as asset class after an advance but also to buy one on weakness. **Asymmetrical** rebalancing is a variation where the allowable upside drift is greater than the allowable downside drift. For instance, an asymmetric range might let stocks drift up by 6% above the current range but down by only 3% before a rebalance is triggered. Using this scheme, holdings of domestic stocks in a portfolio with a targeted range of 35-45% for this asset class could go as high as 51% or as low as 32%. Since the average magnitude of equity bull markets is about twice that of bear markets, this type of strategy would allow investors to capture more of a bull market before a rebalancing is triggered but also to take advantage of an asset class's weakness.

In addition to market-driven events that could lead to a rebalancing, asset allocation policies must be considered when an investor's circumstances change. For individual investors, revisiting asset allocation would follow changes in lifestyle (children, marriage status, death, etc.) or change in income (promotion, career change, unemployment, or a major inheritance), or changes in investment objectives arising from time to retirement, real estate purchase, or education expense.

For a pension fund, revised actuarial assumptions are one of the most likely triggers for asset allocation rebalancing. Also, it might be reasonable for the risk level assumed by a portfolio to be determined by the degree of funding; a retirement fund with a large unfunded liability and long funding period might be justified in an asset allocation dominated by equities while one that is fully funded or close to it might adopt a more conservative, income-oriented strategy.

Whatever the methodology used, there are no regulatory obstacles to rebalancing for Massachusetts retirement systems since PERAC regulations no longer establish permitted percentage ranges for major investment asset classes.

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S U M M A R Y

Asset allocation can be seen as representing an insurance policy against the day when today's hottest sector cools down.

Asset allocation is a practice whose benefits do not enjoy universal intellectual support among market professionals. Almost every week a new article is published proclaiming the death of traditional asset allocation models. Most recently, an article in *The Wall Street Journal* of February 7, 2000 bore the headline, "Fund Diversification Dies a Not Very Slow Death." It noted the

increasing difficulty of financial planners in defending asset allocation in light of the continuing dominant performance of large cap and technology stocks. While it has been a glorious market for investors with portfolios concentrated in these hot areas, it's been "a bear market for asset allocators" in the words of one observer. Yet, this article also noted that asset allocation actually did fairly well in 1999. Although value stocks continued to badly lag growth stocks, international stocks outperformed the S&P 500, emerging markets had a banner year, and small cap stocks also beat the large-cap S&P 500.

A healthy debate will continue over the value of asset allocation and the best way to implement it. Nevertheless, in its most basic form, the objective of asset allocation remains one of prudence. It can be seen as representing an insurance policy against the day when today's hottest sector cools down. Forseeing that day is difficult, and the opportunity costs in investment returns become real and sometimes painful when one sector such as U.S. large cap growth stocks has been dominant for so long. But history and logic both tell us that that day will inevitably come.

At its best, asset allocation should not incorporate rigid, inflexible asset ranges nor should it encourage aggressive, frequent market-timing bets. The most effective use would emphasize the value of diversification among asset classes but also provide the flexibility to act when markets become clearly overvalued or undervalued.

In summary, the goal of asset allocation is to select a combination of assets that will generate a return sufficiently high but also sufficiently safe in order to meet a future financial liability. As noted at the beginning of this report, it is simply an expression of the centuries-old axiom of “don’t put all your eggs in one basket.” To use an even more comforting analogy, asset allocation is like a pillow: if one part of the pillow is punched in, another will puff out, and the benefits of portfolio diversification will provide the investor with steady enough returns so that he or she can sleep well at night.

In reality, the world’s financial markets—and the relationships among them—are sufficiently dynamic and constantly changing so that asset allocation in practice does not conform to simple and cute analogies. Nor does it lend itself to simply choosing portfolio combinations from a neatly drawn graphical curve of “efficient portfolios”. Asset allocation remains more an art than a science since the models and assumptions used are approximations of the realities of an investment universe that is exceedingly complex and constantly changing.

THE REAL WORLD

Despite the lingering controversies and the multitude of available optimization models, there seems to be a surprising degree of uniformity in the typical asset allocation of public pension funds across the country.

A recent analysis of data submitted by nearly all of the public retirement systems overseen by PERAC afforded some reasonable **estimates** of the asset allocation of these systems at year-end 1998. The composite allocation to **domestic equity** is estimated at 47% with a range of between 30% and 65%. Other estimated asset class holdings were **international equity** 6%, **domestic fixed income** 31%, **international fixed income** 2%, domestic and international **balanced funds** 5%, **real estate** 3%, **alternative investments** 1%, **cash**

and other 5%. Once again, while these figures are reasonable estimates, they should not be viewed as “official” because of incomplete data and the possibility that some accounts could be incorrectly categorized.

Here are the reported asset allocations of two major public pension funds as well as an industry composite. Care should be taken in making direct comparisons among specific asset classes in these plans because of possible differences in classification methodology.

Mass. Pension Reserves Investment Trust (PRIT) 6-30-99

Domestic Equity	45%
International Equity	16%
Fixed Income	25%
Emerging Markets	4%
Real Estate	6%
Alternative Investments	4%

California Public Employee Retirement System (CALPERS) 10-31-99

Domestic Equity	45%
International Equity	20%
Domestic Fixed Income	22%
International Fixed Income	4%
Real Estate	5%
Alternative Investments	4%
Cash	1%

“Pensions & Investments” The largest public defined benefit plans 12-31-99

Domestic Equity	47%
International Equity	14%
Domestic Fixed Income	28%
International Fixed Income	2%
Real Estate	5%
Alternative Investments	2%
Other, cash	2%